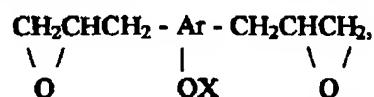


New Claim

20. (New) The diepoxide ethers of claim 1 having the formula



where Ar is a trivalent aromatic radical of 6-20 carbon atoms and X is -R, -COR, -COOR, -SO₂R, or -PORR' and R and R' are the same or different alkyl, alkylene aryl, aryl, arylene alkyl, alkylene alkoxy, alkylene aryloxy, arylene alkoxy and arylene aryloxy radical having from 6-20 carbon atoms.

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EXAMPLE 7

Preparation of Bis-1,2-[2-(2,3-Epoxypropyl)Phenoxy] Ethane

Bis-1,2-(2-allylphenoxy)ethane was prepared from 2-allylphenol and 1,2-dichloroethane as described in Example 6 with the following exception. The crude product was distilled in *vacuo* to remove unreacted 2-allylphenol and the monosubstituted product prior to filtration through silica gel to give a viscous oil. MS *m/z* 294 (*M*⁺ calcd for C₁₂H₂₂O₂=294). H NMR (300 MHz, CDCl₃) d 3.40-3.50 (d, 2, CH₂), 4.40 (s, 2, OCH₂), 5.05-5.14 (m, 2, CH₂ vinyl), 5.90-6.08 (m, 1, CH vinyl), 6.91-7.09 (m, 2, aromatic), 7.18-7.32 (m, 2, aromatic).

Oxidation as described in Example 6 gave the desired diepoxide as a viscous oil. MS *m/z* 326 (*M*⁺ calcd for C₂₀H₂₂O₄=326). H NMR (300 MHz, CDCl₃) d 2.57 (d, 1, CH₂ epoxypropyl), 2.64-3.00 (m, 3, CH₂ epoxypropyl), 3.14-3.30 (m, 2, CH epoxypropyl), 4.40 (s, 2, OCH₂), 6.89-7.02 (m, 2, aromatic), 7.70-7.55 (m, 2, aromatic).

EXAMPLE 8

Preparation of Bis-[2-(2,3-Epoxypropyl)Phenyl]Phenyl Phosphate

Phenyl dichlorophosphate (10.5 g, 0.05 mol) was added dropwise to a solution of 2-allylphenol (13.4 g, 0.1 mol) and triethylamine (13.9 ml, 0.1 mol) in 1,2-dichloroethane (200 ml) and the mixture refluxed for 2 hr. After cooling, the precipitate, triethylamine hydrochloride was filtered, and the organic solution washed with water, dried over anhydrous MgSO₄ and evaporated in *vacuo*. The unreacted 2-allylphenol was removed by vacuum distillation to give bis-[2-allylphenyl] phenyl phosphate as a viscous liquid. MS *m/z* 406 (*M*⁺ calcd for C₂₄H₂₉O₄P=406). H NMR (300 MHz, CDCl₃) d 3.46 (d, 4 CH₂), 4.95-5.15 (m, 4 CH₂ vinyl), 5.82-6.00 (m, 2 CH vinyl), 7.20-7.50 (m, 13, aromatic).

The above diolefin was converted to the desired diepoxide as described in Example 6. H NMR (300 MHz, CDCl₃) d 2.46 (d, 2, CH₂ epoxypropyl), 2.62-2.90 (m, 6, CH₂ epoxypropyl), 3.03-3.11 (m, 2, CH epoxypropyl), 7.21-7.51 (m, 13, aromatic).

EXAMPLE 9

Preparation of Isophthalic Acid: Bis-[2-(2,3-Epoxypropyl) Phenyl Ester]

Isophthaloyl dichloride (3.19 g, 0.0157 mol) and 2-allylphenol (4.21, 0.0313 mol) were diluted with dichloromethane (50 ml) and triethylamine (3.16 g, 0.0313 mol) added dropwise at room temperature. After stirring for 3 hr at room temperature, the amine hydrochloride was removed by filtration and the organic solution washed with water and dried over anhydrous MgSO₄. Evaporation of the solvent in *vacuo* gave the bis-allylphenyl isophthalate as a colorless oil. MS *m/z* 398 (*M*⁺ calcd for C₂₀H₂₂O₄=398). H NMR (300 MHz, CDCl₃) d 3.46 (d, 2, CH₂), 5.01-5.12 (m, 2, CH₂ vinyl), 5.90-6.05 (m, 1, CH vinyl), 7.20-7.40 (m, 4, aromatic), 7.65-7.77 (m, 1, aromatic), 8.25-8.33 (m, 1, aromatic), 9.05 (s, 1, aromatic).

The above diolefin was converted to the desired diepoxide as described in Example 6. H NMR (300 MHz, CDCl₃) d 2.3 (d, 1, CH₂ epoxypropyl), 2.62-2.96 (m, 3, CH₂ epoxypropyl), 3.22-3.30 (m, 1, CH epoxypropyl), 7.15-7.47 (m, 4, aromatic) 7.83-7.91 (m, 1, aromatic), 8.25-8.33 (m, 1, aromatic), 9.05 (s, 1, aromatic).

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EXAMPLE 10
Preparation of 3,6-Bis-[2-(2,3-Epoxypropyl)Phenoxy] Pyridazine

2-Allylphenol (10 g, 0.075 mol) was added to a solution of peracetic acid (30 g, 30% active) in dichloromethane (100 ml) that had been dried over anhydrous MgSO₄. The reaction mixture was stirred at room temperature for 48 hrs. The dichloromethane solution was washed with water, dilute aqueous NaCO₃, dilute aqueous NaSO₃, and dried over anhydrous MgSO₄. After evaporation of the solvent in *vacuo*, 2-(2,3-epoxypropyl)phenol was isolated as viscous liquid. MS *m/z* 150 (*M*⁺ calcd for C₁₁H₁₆O₂=150). H NMR (300 MHz, CDCl₃) d 2.65-2.80 (m, 2, CH₂ epoxypropyl), 2.87-2.93 (m, 1, CH₂ epoxypropyl), 3.10-3.21 (m, 1, CH, epoxypropyl), 3.50-3.60 (m, 1, CH epoxypropyl), 6.80-7.25 (m, 4, aromatic). 2-(2,3-Epoxypropyl)phenol (0.9 g, 0.006 mol) was added to a solution of powdered sodium hydroxide (0.24 g, 0.006 mol) in dimethylacetamide (30 ml) and the solution heated at 80°C for 1 hr. The reaction mixture was diluted with water and extracted with dichloromethane, dried over anhydrous MgSO₄ and evaporated in *vacuo* to give a solid that on recrystallization from methanol gave product mp 150-152°C. MS *m/z* 376 (*M*⁺ calcd for C₂₂H₂₆N₂O₄=376). H NMR (300 MHz, CDCl₃) d 3.62 (dq, 2, CH₂ epoxypropyl), 4.57 (dq, 2, CH₂ epoxypropyl), 5.15-5.32 (m, 1, CH epoxypropyl), 6.78-6.93 (m, 2, aromatic), 7.11 (s, 1, heteroaromatic), 7.15-7.28 (m, 2, aromatic).

EXAMPLE 11

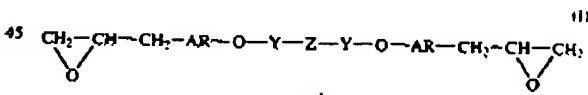
Preparation of 4-[2-(2,3-Epoxypropyl)Phenyl]Sulfone

This compound was prepared using dichlorophenyl sulfone and 2-allylphenol as described in Example 10. The compound is a viscous liquid and was purified by column chromatography utilizing silica gel. H NMR (300 MHz, CDCl₃) d 3.35 (dq, 2, CH₂ epoxypropyl), 3.91 (dq, 2, CH₂ epoxypropyl), 5.03-5.20 (m, 1, CH epoxypropyl), 6.84-7.03 (m, 2, aromatic), 7.22-7.35 (m, 2, aromatic), 7.75 (d, 2, aromatic).

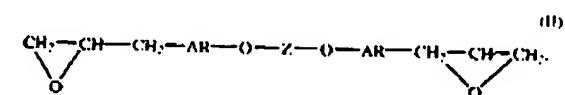
The preparation of epoxy resins from the described epoxides of the present invention follows procedures described in the literature for the preparation of epoxy resins.

What is claimed is:

1. Diepoxide ethers of allyl phenols having the formulas:

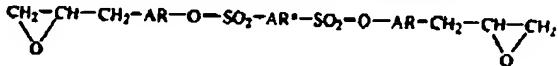


and



55 where Y is a CO, CO₂ or SO₂, AR is the same or different divalent unsubstituted or substituted aromatic, halogen-substituted aromatic or cyano-substituted aromatic hydrocarbon radical having from 6 to 20 carbon atoms, Z is a divalent hydrocarbon or ether radical having from 1 to 20 carbon atoms, and Y-Z-Y is CO.

2. The diepoxide esters of claim 1 having the formula:



where AR* is a divalent aromatic radical of 6 to 20 carbon atoms.